

# A survey on Anthomedusae (Hydrozoa: Hydroidomedusae) from the Taiwan Strait with description of new species and new combinations

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## Abstract

New data on Anthomedusae are included. Seven new species and 2 new combinations are described. An additional *Teissiera polypofera* Xu, Huang and Chen, 1991 is redescribed and its position of taxonomy is discussed. Other lists of species on Anthomedusae are summarized.

**Key words:** Anthomedusae, taxonomy; Bougainvillidae, Pandeidae, Protiaridae, Tessieridae, Zancleidae

## 1 Introduction

This report provides a systematization of the Anthomedusae collected from the Minnan-Taiwan Bank fishing ground upwelling region, the Luoyuan Bay, and the varied island waters of Fujian from 1985 to 2001. The Anthomedusae represents 88 species belonging to 21 families, 42 genus. Seven new species (see Table 1) are described, i.e., *Bougainvillia longistyla* n. sp., *Koellikerina staurogaster* n. sp., *Nubiella atentaculata* n. sp., *Leuckartiara jianyinensis* n. sp., *Leuckartiara neustona* n. sp., *Halitiara obtusus* n. sp., and *Halitiarell apicea* n. sp. In addition, two new combinations are revised, i. e., *Merga minutum* (Xu, Huang and Chen, 1991) transl. nov., *Zanclea macrocystae* (Xu, Huang and Chen, 1991) transl. nov. *Teissiera polypofera* Xu, Huang and Chen, 1991 is redescribed and

its position of taxonomy is discussed. The present paper uses this material to update the Anthomedusae in our previous monograph. All type specimens are deposited in the Department of Oceanography, Xiamen University.

## 2 Account of species

Family Bougainvillidae Lütken, 1850

*Bougainvillia longistyla* n. sp. (see Fig. 1)

Umbrella nearly hemispherical, height: 1.0~1.5 mm, width: 1.2~2.0 mm; apex rounded, with mesoglea thick at apex, thinning towards the lateral walls; stomach quadrangular, very flat, adnate to subumbrella, without peduncle and mouth tubular, with simple circular mouth, rim thicker, with 4 perradial oral tentacles, divided dichotomously 3 or 4 times, inserted distinctly above mouth rim and armed with cnidocyst clusters, oral tentacles with very long basal trunks, about 5/6 as long as oral tentacles,

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Table 1. List of species on Anthomedusae (1962-2003)

	Continued from Table 1
Class Hydroidomedusae Claus, 1877	Genus <i>Rathkea</i> Brandt, 1838
emend (Bouillon and Boero, 2000)	<i>R. octopunctata</i> (M. Sars, 1835)
Subclass Anthomedusae Haeckel, 1879	Suborder Pandeidae Haeckel, 1879
Order Filifera Kühn, 1913	Family Bythotiaridae Maas, 1905 (=Calycopsidae)
Suborder Margelina Haeckel, 1879	Genus <i>Heterotiar</i> Maas, 1905
Family Australomedusidae Russell, 1971	<i>H. minor</i> Vanhöffen, 1911
Genus <i>Platystoma</i> Zhang, 1982	Genus <i>Gymnogonium</i> Xu and Huang, 1994
<i>P. bitentaculata</i> Xu, Huang and Chen, 1991	<i>G. zhengzhongii</i> Xu and Huang, 1994
<i>P. dongshanensis</i> Xu and Huang, 1994	Family Niobiidae Petersen, 1979
<i>P. nanhaiensis</i> Zhang, 1982	Genus <i>Niobia</i> Mayer, 1900
Family Bougainvillidae Lütken, 1850	<i>N. dendrotentaculata</i> Mayer, 1900
Genus <i>Bougainvillia</i> Lesson, 1830	Family Pandeidae Haeckel, 1879
<i>B. bitentaculata</i> Uchida, 1925	Genus <i>Amphinema</i> Haeckel, 1879
<i>B. britannica</i> (Forbes, 1841)	<i>A. australis</i> (Mayer, 1900)
<i>B. fulva</i> Agassiz and Mayer, 1899	<i>A. dinema</i> (Péron and Lesueur, 1810)
<i>B. longistyla</i> n. sp.	<i>A. physophorum</i> (Uchida, 1927)
<i>B. niobe</i> Mayer, 1894	<i>A. rugosum</i> (Mayer, 1900)
<i>B. paraplatygaster</i> Xu, Huang and Chen, 1991	<i>A. turrida</i> (Mayer, 1900)
<i>B. platygaster</i> (Haeckel, 1879)	Genus <i>Cirrhitiara</i> Hartlaub, 1913
<i>B. ramosa</i> (van Beneden, 1844)	<i>C. simplex</i> Xu, Huang and Chen, 1991
Genus <i>Koellikerina</i> Kramp, 1939	Genus <i>Leuckartiara</i> Hartlaub, 1914
<i>K. constricta</i> (Menon, 1932)	<i>L. hoepplii</i> Hsu, 1928
<i>K. diforficulata</i> Xu and Zhang, 1978	<i>L. jianyinensis</i> n. sp.
<i>K. fasciculata</i> (Péron and Lesueur, 1810)	<i>L. neustona</i> n. sp.
<i>K. heteronemalis</i> Xu, Huang and Chen, 1991	<i>L. octona</i> (Fleming, 1823)
<i>K. staurogaster</i> n. sp.	<i>L. orientalis</i> Xu, Huang and Chen, 1991
<i>K. taiwanensis</i> Xu, Huang and Chen, 1991	Genus <i>Merga</i> Hartlaub, 1914
Genus <i>Nemopsis</i> L. Agassiz, 1849	<i>M. macrobulbosa</i> Xu, Huang and Chen, 1991
<i>N. bachei</i> L. Agassiz, 1849	<i>M. minutum</i> (Xu, Huang and Chen, 1991),
<i>N. hexacanal</i> Huang and Xu, 1994	transl. nov.
Genus <i>Nubiella</i> Bouillon, 1980	<i>M. tergestina</i> (Neppi and Stiasny, 1912)
<i>N. atentaculata</i> n. sp.	Genus <i>Pandea</i> Lesson, 1843
Family Clavidae McCrady, 1859	<i>P. conica</i> (Quoy and Gaimard, 1827)
Genus <i>Turritopsis</i> McCrady, 1859	Genus <i>Pandeopsis</i> Kramp, 1959
<i>T. lata</i> Ledenfeld, 1884	<i>P. ikarii</i> Kramp, 1959
<i>T. nutricula</i> McCrady, 1859	Family Proboscidiactylidae Hand and Hendrickson, 1950
Family Cytaeidae L. Agassiz, 1829	Genus <i>Proboscidiactyla</i> Brandt, 1834
Genus <i>Cytaeis</i> Eschscholtz, 1829	<i>P. ornate</i> (McCrady, 1859)
<i>C. tetrastyla</i> Eschscholtz, 1829	Family Protiaridae Haeckel, 1879
Family Hydractiniidae L. Agassiz, 1862	Genus <i>Halitiara</i> Fewkes, 1882
Genus <i>Hydractinia</i> van Beneden, 1841	<i>H. obtusus</i> n. sp.
<i>H. apicata</i> Kramp, 1959	Genus <i>Halitiarella</i> Bouillon, 1980
<i>H. carnea</i> M. Sars, 1846	<i>H. apicea</i> n. sp.
<i>H. minima</i> (Trinci, 1903)	Genus <i>Latiitiara</i> Xu and Huang, 1990
Family Rathkeidae Russell, 1953	<i>L. orientalis</i> Xu and Huang, 1990
Genus <i>Allorathkea</i> Schmidt, 1972	Genus <i>Paratiara</i> Kramp and Damas, 1925
(= <i>Pseudorathkea</i> Xu and Huang, 1990)	<i>P. digitalis</i> Kramp and Damas, 1925
<i>A. macrogastrica</i> (Xu and Huang, 1990)	Order Capitata Kühn, 1913

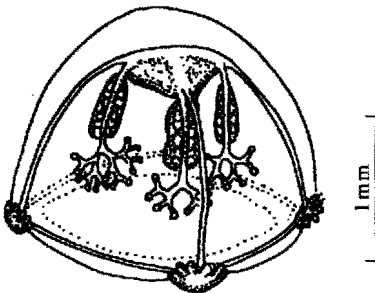
To be continued

To be continued

Continued from Table 1

- Suborder Moerisiida Poche, 1914  
 Family Moerisiidae Poche, 1914  
 Genus *Moerisia* Boulenger, 1908  
*M. inkermanica*  
 (Paltschikowa-Ostroumova, 1925)  
 Genus *Odessia* Paspaleff, 1937  
*O. microtentaculata* Xu, Huang and Chen, 1991  
 Family Halimedesidae Arai and Brinckmann-Voss, 1980  
 Genus *Tiaricodon* Browne, 1902  
*T. coeruleus* Browne, 1902  
 Family Hydrocorynidae Rees, 1951  
 Genus *Hydrocoryne* Stechow, 1907  
*H. miurensis* Steckow, 1907  
 Suborder Tubulariida Fleming, 1828  
 Family Corynidae Johnston, 1836  
 Genus *Dicodonium* Haeckel, 1879  
*D. jeffersoni* (Mayer, 1990)  
 Genus *Dipurena* McCrady, 1859  
*D. strangulata* McCrady, 1859  
 Family Corymorphidae Allman, 1872  
 Genus *Euphysora* Maas, 1905  
*E. abaxialis* Kramp, 1962  
*E. apicoloculifera* Xu and Huang, 2003  
*E. bigelowi* Maas, 1905  
*E. brunnescentis* Huang, 1999  
*E. crassocanalus* Xu and Huang, 2003  
*E. interrogona* Xu and Huang, 2003  
*E. knides* Huang, 1999  
*E. macrobulbus* Xu and Huang, 2003  
*E. solidonema* Huang, 1999  
*E. taiwanensis* Xu and Huang, 2003  
*E. verrucosa* Bouillon, 1978  
 Genus *Vannuccia* Brinckmann-Voss, 1967  
*V. forbesii* (Mayer, 1894)

To be continued

Fig. 1. *Bougainvillia longistyla* n. sp.

length of whole oral tentacle almost extending to umbrella margin; upside of 4 elliptic-like go-

Continued from Table 1

- Family Euphysidae Haeckel, 1879  
 Genus *Cnidocodon* Bouillon, 1978  
*C. xiamenensis* (Zhang and Wu, 1981)  
 Genus *Euphysa* Forbes, 1848  
*E. aurata* Forbes, 1848  
 Genus *Euphysilla* Kramp, 1955  
*E. pyramidata* Kramp, 1955  
 Genus *Euphysomma*, 1962  
*E. brevia* Uchida, 1947  
 Family Tubulariidae Fleming, 1828  
 Genus *Ectopleura* L. Agassiz, 1862  
*E. dumortieri* (van Beneden, 1844)  
*E. guangdongensis* Xu, Huang and Chen, 1991  
*E. latitaeniata* Xu and Zhang, 1978  
*E. minerva* Mayer, 1900  
*E. sacculifera* Kramp, 1957  
*E. xiamenensis* Zhang and Lin, 1984  
 Genus *Hybocodon* L. Agassiz, 1862  
*H. prolifer* L. Agassiz, 1862  
 Suborder Zancleida Russell, 1953  
 Family Porpitidae Goldfuss, 1818  
 Genus *Porpita* Lamarck, 1801  
*P. porpita* (Linnaeus, 1758)  
 Genus *Verella* Lamarck, 1801  
*V. vellella* (Linnaeus, 1758)  
 Family Tesieridae Bouillon, 1974  
 Genus *Teissiera* Bouillon, 1974  
*T. australe* Bouillon, 1978  
*T. polyopfera* Xu, Huang and Chen, 1991  
*T. medusifera* Bouillon, 1978  
 Family Zancleidae Russell, 1953  
 Genus *Zanclea* Gegenbaur, 1857  
*Z. costata* Gegenbaur, 1857  
*Z. macrocystae*  
 (Xu, Huang and Chen, 1991), transl. nov.

nads connected to perradial stomach wall, downside extending along the oral tentacles basal trunk to upside of oral tentacles dichotomously; from lateral view, each gonad looking like hanging down in subumbrella cavity; with 4 radial canals and ring canal; 4 radially placed tentacular bulbs, each bearing 4-6 clusters of solid marginal tentacles, without ocelli; velum narrow.

This new species has radially placed clusters of solid marginal tentacles; the tentacle of

each cluster all alike; with 4 perradial oral tentacles dichotomously branching; gonad on manubrium in perradial position; without ocelli. So it belongs to *Bougainvillia* Lesson, 1830. At the present time only 22 valid species in the *Bougainvillia* are known. This new species with very flat stomach, quadrangular, without peduncle, differs from the other species in this genus, but similar to *B. platygaster* (Haeckel, 1879) and *B. paraplatygaster* Xu, Huang and Chen, 1991. A comparison of these two species with our new species is given in Table 2.

Type specimens: holotype, No. AOB-HL125; paratype, No. AOB-HL126. Two speci-

mens were collected from the southern part of the Taiwan Strait in September 1988.

with short and thick trunks, divided into 3 bifurcations, with very short branches, each with a terminal nematocyst knob; 4 broad radial canals and ring canal; velum development; with 8 groups of marginal tentacles, all alike in structure, with 5 marginal tentacles in each perradial, 3 in each interradial group; perradial bulbs triangular, larger, about 1.5 times as long as interspaces, interradial bulbs small, linear, about 3 times as long as interspaces, all tentacles bulbs abaxial with dark-red ocelli.

This new species has 8 groups of marginal tentacles, 4 perradial and 4 interradial, all alike in structure; with 4 perradial oral tentacles,

Table 2. Comparison of main shape characteristics of 3 species of *Bougainvillia*

Characteristic	<i>B. paraplatygaster</i>	<i>B. platygaster</i>	<i>B. longistyla</i> n. sp.
Umbrella	nearly globe-shape, mesoglea thick	globe-shape, mesoglea thick	nearly hemispherical, mesoglea thick
Manubrium	no peduncle and mouth tubular	no peduncle, with mouth tubular	no peduncle and mouth tubular
Gonads	perradial, extending along adradial sides of stomach, smooth	interradial, short and flat, with medusa buds and polyoid buds	perradial, upside of gonads connected to stomach wall, downside extending along oral tentacle basal trunk to upside of dichotomously branch
Oral tentacles	very short trunk, 4 thick cluster of oral tentacles, each with 4 main oral tentacles, 6~7 times	short, divided 5~6 times immediately from base	very long trunk, about 5/6 as long as oral tentacles, divided 3~4 times
Marginal bulbs	kidney-shape, with 14~17 tentacles	triangular, with 10~13 tentacles	kidney-shape, with 4~6 tentacles
Ocelli	present	present	none

*Koellikerina staurogaster* n. sp. (see Fig. 2)

Umbrella nearly ovaliform, with thick jelly, apex rounded, height: 1.8 mm, width: 1.5 mm; manubrium without peduncle, with short and thick mouth tubular, from facing dorsal view, stomach cruciform (see Fig. 2b), with simple circular mouth; with 4 perradial, elliptic-like gonads, smooth, slightly extending outwards along the radial canals; 4 perradial oral tentacles

divided into 3 bifurcations; gonads on manubrium perradial, so they belong to *Koellikerina* Kramp, 1939. At the present time, only 10 valid species in *Koellikerina* are known. This new species umbrella has no apical projection, manubrium without peduncle, with short and thick mouth tubular, stomach cruciform; these features differ from all *Koellikerina* species, but the closest species is *K. massi* (Browne, 1910) and *K. multicirrata* (Kramp, 1928). *K. massi* also has stomach cross-shaped, though they are

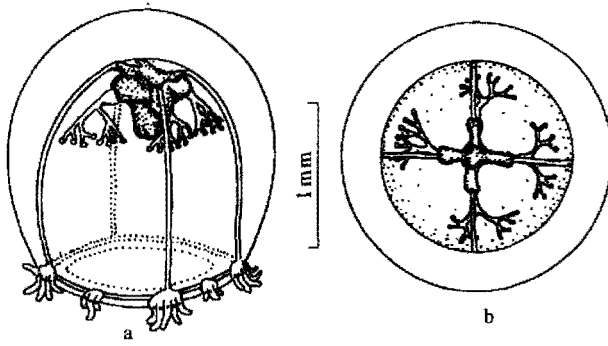


Fig. 2. *Koellikerina staurogaster* n. sp. a. Lateral view and b. facing dorsal view.

gonad 4 masses, covering nearly the whole interradial wall of stomach; 4 oral tentacle divided 7–8 times; 8 marginal groups of 5–7 tentacles each; no ocelli; *K. multicirrata* has stomach short without cross-shaped; gonads perradial, V-shaped, each with 1 median and 2–3 pairs of lateral folds; oral tentacles divide 6–7 times, or more; marginal bulbs linear, broader than interspaces, each with 12–16 tentacles; with ocelli. These features differ from *K. staurogaster* n. sp., as follows: with stomach cruciform; with 4 perradial, elliptic-like gonads, smooth, slightly extending outwards along the radial canals; oral tentacle divided into 3 bifurcations; perradial bulbs larger, triangular, with 5 tentacles, interradial bulbs small, linear, with 3 tentacles, all tentacles bulbs with ocelli (see Table 3).

Type specimens: holotype, No. AOB–HL 127. One specimen was collected from the southern part of the Taiwan Strait in July 1988.

*Nubiella atentaculata* n. sp. (Fig. 3)

Umbrella bell-shaped, 2 mm high, 1.5 mm wide, with slight rounded top, mesoglea thick especially in the apical region, thinning gradually toward umbrella margin; subumbrella cavity spacious, presenting 4 apical interradial conical projections into the apical mesoglea; stomach elliptic-like, about 1/3 the length of subumbrella cavity; mouth simple, without lips, surrounded by conspicuous ring of dark-brown pigment; with 12 simple unbranched oral

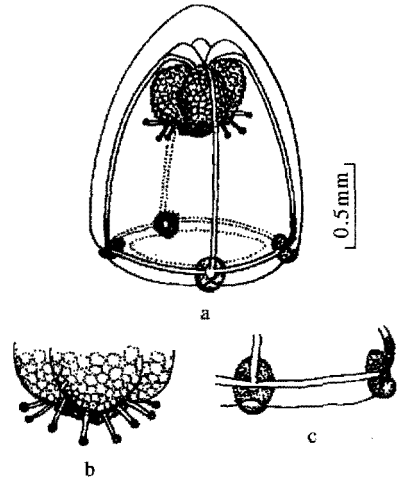


Fig. 3. *Nubiella atentaculata* n. sp. a. Lateral view, b. enlargement of gonad and oral tentacle and c. detail of marginal bulb.

tentacles, rising well above mouth rim and armed with cnidocyst cluster; velum moderately broad; 4 radial canal and ring canal conspicuous; 4 large, ovaliform gonads situated on the perradial of the stomach and extending toward interradial, scattered numerous round, granulose sex cell on the gonads, the outline of each gonad resembling a “berryfruit”; 4 perradial marginal bulbs, differing in size and structure, of which 2 opposite bulbs are smaller than the others, with a short club-shaped endodermal process, extending slightly upwards from the basal bulbs into radial canal, surface of club-shaped process with brown pigment, all marginal bulbs elliptic-like, from subumbrella

Table 3. Comparisons between the different species of the genus *Koellikerina*

Species	Apical projection	Shape of manubrium	Number and position of gonads	Size of oral tentacles trunk	Number of oral tentacle dichotomously	Number of each cluster marginal tentacles	Shaped of tentacle bulbs tentacle	Interspaces of between bulbs	Ocelli
<i>Koellikerina constricta</i>	present	short peduncle, stomach globular	4 perradial, 3 pair of lateral folds	slender	6~7	7~8	triangular	1/2 as broad as interradial	present
<i>K. diforficulata</i>	none	short peduncle, stomach large, broad	4 perradial 3~4 transversal folds	short, thick	2	5	linear	narrow	present
<i>K. fasciculata</i>	none	short, broad peduncle	4 perradial, horseshoe-shaped, with 9~10 transverse furrows	slender, short	6~8	up to 23	triangular	narrow	present
<i>K. elegans</i>	none	slender, conical peduncle, stomach pear-shaped	4 interradial, smooth	short, thick	divided 3 times, each tip with 3 small branches with nematocysts	4 perradial, 3 interradial	triangular	narrow	present
<i>K. heteronemalis</i>	present	short, conical peduncle, stomach very flat	8 adradial, ovaliform, no folds	short, thick	5~6	5	kidney-shaped	broad	present
<i>K. maasi</i>	none	without peduncle, stomach large, crossshaped	4 interradial, mass-shaped	short, thick	7~8	5~7	triangular	narrow	none
<i>K. multicirrata</i>	none	no peduncle, stomach short	4 perradial, V-shaped, 2~3 pairs lateral folds	long, thick	6~7 or more	12~16	linear	narrow	present
<i>K. octonemalis</i>	none	stomach upon a short, wide, conical peduncle	4 interradial, doubly cleft, smooth	very short	4~5	7~9 perradial, 5~7 interradial	small triangular	broader	present
<i>K. ornata</i>	presenting a large orange patch at tip	slender peduncle, mouth tube long and slender, stomach doliform folds	4 perradial, elongated horseshoe-shaped, 4~5 lateral folds	unknow	5~6	11~13, each bulb with 2 bright orange abaxial spots	linear	narrow	present
<i>K. taiwanensis</i>	presenting a large globose at tip	short peduncle, stomach bowl-shaped	8 adradial, 3~4 oblique split folds each	very short	4 clusters, each with 4 main oral tentacles, each with 4~5 branches	12~14 perradial, 8~10 interradial	linear perradial and interradial tentacle bulbs unequal size	narrow	present
<i>K. staurogaster</i> n. sp.	none	no peduncle, with short and thick mouth tube, stomach cruciform	4 perradial, elliptic-like smooth, extending outwards radial canal	short, thick	3	5 perradial, 3 interradial	triangular in perradial, linear in interradial	broad	present

margin slightly clasping the exumbrella margin, without developed tentacles; without ocelli.

This new species has simple unbranched oral tentacles; with 4 marginal bulbs, placing this medusa in the genus *Nubiella* Bouillon, 1980. At the present time, only 1 species in the *Nubiella* is known: *N. mitra* Bouillon, 1980, with 4 simple unbranched oral tentacles; with 4 solitary marginal tentacles but all of the same structure; and medusa buds surrounding stomach wall. These features differ from *N. atentaculata* n. sp., as follows: with 12 simple unbranched oral tentacles; with 4 perradial marginal bulbs differing in size and structure, of which 2 opposite bulbs have a short club-shaped endodermal process, extending slightly upwards from the basal bulbs into radial canal; 4 perradial gonads, "berryfruit" like; all marginal bulbs without developed tentacles.

Type specimens: holotype, No. AOB-HL 128. One specimen was collected from the southern part of the Taiwan Strait in December 1987.

Family Pandeidae Haeckel, 1879

*Leuckartiara jianyinensis* n. sp. (Fig. 4)

Umbrella bell-shaped, with a large, solid, globular apical projection not exceeding 1/2 of the height of the bell, height: 10 mm (including the apical projection); width: 7.5 mm; stomach large

and broad, almost occupying the whole subumbrella cavity, but not exceeding velar opening, 2/3 of the height of the manubrium connected to the radial canals by mesenteries, mouth quadrangular, with short, folded, crenulata lips; 4 horseshoe-shaped, interradial gonads, each with two adradial series of 4-5 transverse folds directed towards the perradii, connected by 2 transverse bridges situated in the middle of the gonad; 4 broad radial canals, slightly jagged; ring canal narrows; 4 marginal tentacles, perradial, hollow, long, laterally compressed, each bearing a conspicuous short abaxial spur, with ocelli; 1 interradial, short, filiform, rudimentary tentacles in between successive tentacles, completely adnate to the exumbrellar margin, abaxial ocelli on the terminal each rudimentary tentacles; velum narrow.

This new species has a manubrium connected to radial canals by mesenteries; its gonads are interradial and typically horseshoe-shaped. So it belongs to *Leuckartiara* Hartlaub, 1914. At the present time only 15 valid species in *Leuckartiara* are known. This new species can easily be distinguished from the other species of *Leuckartiara* by 2 main characteristics: 4 short, filiform, interradial rudimentary tentacles, completely adnate to the exumbrellar margin; 2 adradial series of gonads, connected by 2 transverse bridges situated in the middle of the gonad; other less specific characteristics are the shape of apical projection, number of marginal tentacles, and the length of mesenteries. The closest species is *L. brownei* Larson and Harbison, 1990, which also has filiform rudimentary tentacles and 4 developed tentacles, though they are umbrella margin with 28 long filiform tentacles, grow in succession, and clasp the exumbrella, without ocelli on the terminal (see Table 4).

Type specimens: holotype, No. AOB-HL 129. One specimen was collected from the southern part of Jianyin Islands waters of Fujian in August 1990.

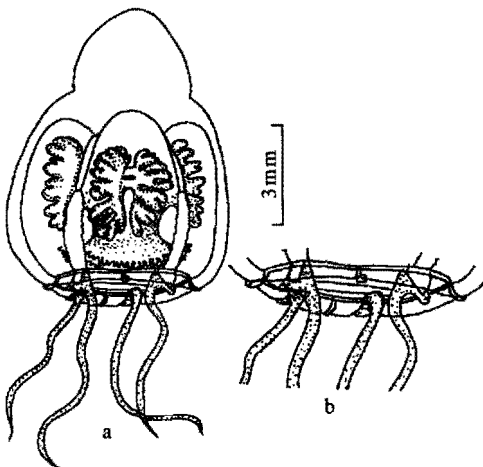


Fig. 4. *Leuckartiara jianyinensis* n. sp.

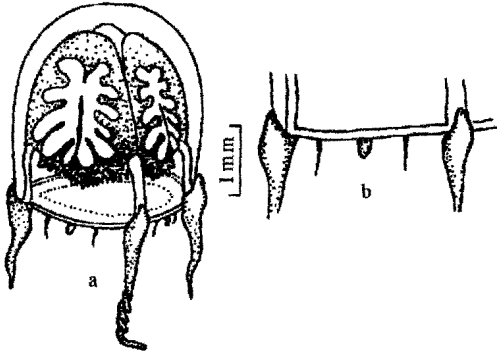
*Leuckartiara neustona* n. sp. (Fig. 5)

Fig. 5. *Leuckartiara neustona* n. sp. a. Side view and b. enlargement of umbrella margin.

Umbrella bell-shaped without apical projection, height: 3.0 mm, width: 2.0 mm, stomach large and broad, almost filling the subumbrella cavity, but not extending beyond the umbrellar margin; mouth broad and large, quadrangular, with short, folded, crenulate lips; 4 horseshoe-shaped, interradial gonads each with 2 adradial series of 5~6 transversal folds slightly obliquely downwards towards the perradii, the adradial parts interradially connected in the uppermost part of the gonad,  $\frac{2}{3}$  of the height of the manubrium connected to the radial canals by mesenteries; 4 medial broad radial canals without jagged margins; ring canal narrows; 4 well developed hollow marginal tentacles, tentacles bulbs laterally compressed, with distinct abaxial spurs, none ocelli; 2 adradial, short, filiform, rudimentary tentacles, without ocelli, and 1 interradial, club-shaped marginal rudimentary bulbs, with abaxial red ocelli on tentacular bulbs in between successive perradial marginal tentacles; velum broad.

This new species has a manubrium connected to radial canals by mesenteries; its mouth has a crenulated margin; its gonads are interradial and typically horseshoe-shaped, allowing its inclusion in the *Leuckartiara*. Main characteristics of this new species are: umbrella with-

out apical projection; 4 developed marginal tentacles, bulbs without ocelli; 2 adradial, short, filiform, rudimentary tentacles without ocelli, and 1 interradial, club-shaped marginal rudimentary bulbs with ocelli in between successive perradial marginal tentacles. The closest species is *L. octona* (Fleming, 1823), which also has 1~3 club-shaped marginal rudimentary bulbs, though they are umbrella with apical projection, umbrella margin with 12~32 developed tentacles, without adradial filiform rudimentary tentacles (see Table 4).

Type specimens: holotype, No. AOB-HL 130. One specimen was collected with the *Manta neustox* net from the southern part of the Taiwan Strait in August 1988.

*Merga minutum* (Xu, Huang and Chen, 1991) transl. nov. (Fig. 6).

*Halitiarella minutum* Xu, Huang and Chen, 1991, 475~476, Figs 9a-b.

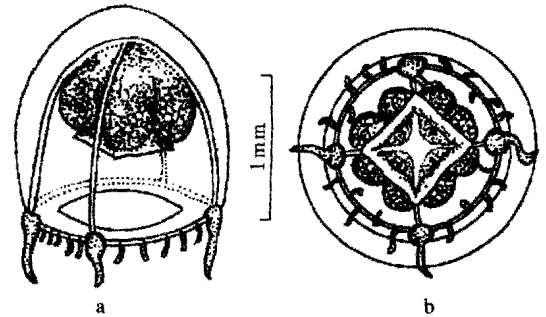


Fig. 6. *Merga minutum* (Xu, Huang and Chen, 1991) transl. nov. a. Side view and b. facing oral view.

Xu, Huang and Chen (1991) described a *Halitiarella minutum* with 8 adradial gonads at the manubrium. It does not belong to the genus *Halitiarella*. According to the number and position of gonads, tentacles structure and long mesenteries of *Halitiarella minutum* allow its inclusion in the genus *Merga*, family Pandeidae.

At the present time, only 6 species in the *Merga* are known. This medusa's main characteristics are as follows: umbrella without api-



Table 4. The key to the world species of Genus *Leuckartiara*

- 
- 1 exumbrella with longitudinal canal-like bands or ribs = 2
- 1a exumbrella without longitudinal canal-like bands or ribs = 3
- 2 with 4 large perradial and 8~12 smaller tentacles of varying size; no distinct apical projection; horseshoe fold in the uppermost part of gonads = *L. zacaе* Bigelow 1940
- 2a with only 4, perradial tentacles and some minute tentaculates; with conical apical projection; transverse bridge in the middle part of gonads = *L. gardineri* Browne 1916
- 3 umbrella margin with filiform rudimentary tentacles = 4
- 3a without filiform rudimentary tentacles = 9
- 4 filiform rudimentary tentacles clasp or adnate to the exumbrella = 5
- 4a filiform rudimentary tentacles without clasp or adnate to the exumbrella = 8
- 5 with 4 developed tentacles = 6
- 5a with up to 8 developed tentacles = 7
- 6 28 long, filiform, rudimentary tentacles grow in succession, and clasp the exumbrella, without ocelli on the terminal = *L. brownie* Larson and Harbison 1990
- 6a 4 short, filiform, rudimentary tentacles, adnate to exumbrella, abaxial ocelli on the terminal = *L. jianyinensis* n. sp
- 7 with 8 large tentacles, with elongated bulbs, with short abaxial spurs, other with 8 small adradial, filiform tentacles, their proximal part adnate to umbrella margin and continued upwards on exumbrella = *L. annexa* (Kramp, 1957)
- 7a 20~23 large tentacles with laterally compressed elongated bulbs, no abaxial spurs, up to 3 rudimentary tentacles between adjacent tentacles completely adnate to exumbrella ridges nearly to summit = *L. adnata* Pages, Gieei and Bouillon, 1992
- 8 with 8 well developed tentacles, with 24 very short rudimentary tentacles each with a small median cirrus = *L. hoepplii* Hsu, 1928
- 8a 4 perradial tentacles, equal size, 2 adradial short, filiform, rudimentary tentacles and 1 interradial, club-shaped marginal rudimentary bulbs in between successive tentacles = *L. neustona* n. sp.
- 9 with well developed apical projection = 10
- 9a without well developed apical projection = 15
- 10 developed tentacles bulbs with abaxial spurs = 11
- 10a developed tentacles bulbs without abaxial spurs = 12
- 11 4 developed tentacles, 4 interradial rudimentary bulbs = *L. simplex* Bouillon, 1980
- 11a with 12~32 developed tentacles, with 1~3 club-shaped marginal rudimentary bulbs in between adjacent tentacles = *L. octona* (Fleming, 1823)
- 12 all tentacles of equal structure = 13
- 12a all tentacles of unequal structure, with tentacular rudiments between the large tentacles = 14.
- 13 about 40 tentacles of varying size, with ocelli = *L. nobilis* Hartlaub, 1913.
- 13a 100 or more densely crowded tentacles, without ocelli = *L. brevicornis* (Murbach and Shearer, 1902).
- 14 4 perradial, 4 interradial, 1~3 marginal bulbs between successive tentacles = *L. foersteri* Arai and Brinckmanvoss, 1980
- 14a 2 long tentacles issued from voluminous laterally compressed bulbs; 2 short tentacles issued from small conical not compressed bulbs; 3 rudimentary tentacles between each successive tentacles = *L. eckerti* Bouillon, 1985
- 15 mesenteries along entire length of stomach = *L. grimaldii* Ranson 1936
- 15a mesenteries along 1/2~1/3 length of stomach = 16
- 16 8 developed tentacles, without abaxial spurs, with ocelli, 1 small rudimentary marginal bulbs between each successive tentacles = *L. orientalis* Xu, Huang and Chen, 1991
- 16a 4 perradial tentacles, no equal size, 2 opposites are better developed than the other 2 without interradial, club-shaped marginal rudimentary bulbs in between successive tentacles = *L. abyssii*, (Go Sars, 1874)
-

cal projection; 8 adradial gonads, smooth, at the manubrium; 1/2 of the height of manubrium connected to the radial canal by mesenteries; 4 perradial tentacles with long conical-shaped

bulbs without ocelli, and 5 club-shaped tentaculates between tentacles, without bulbs, with ocelli. These features differ from those of the other species of *Merga* (Table 5).

Table 5. The key to the species of Genus *Merga*

1	umbrella with an apical projection = 2
1a	umbrella without an apical projection = 4
2	with 4-8 developed tentacles = 3
2a	with 16 developed tentacles, tentacles bulbs large, triangular, 4 perradial bulbs with band-haped ocelli, 12 other bulbs with dot-like ocelli, stomach with a well developed neck and strongly folded lips = <i>Merga galleri</i> Anita Brinckmann, 1962
3	4 perradial tentacles, tentacles bulbs large, long cylindrical shaped, 2 tentaculates between tentacles, without bulbs, all tentacles bulbs without ocelli = <i>M. bulbosa</i> Bouillan, 1980
3a	4-8 developed tentacles with cylindrical-shaped bulbs, with ocelli, a few very small rudimentary bulbs without ocelli = <i>M. tergestina</i> (Neppi and Stiasny, 1911)
4	gonad interradial: 4 perradial tentacles with large, conical basal bulbs and 4 interradial, tenon-like tentaculates, = <i>M. reesi</i> Russell, 1956
4a	gonad adradial, = 5
5	4 perradial tentacles, = 6
5a	8-12 long and 24-36 rudimentary tentacles, all with ocelli. = <i>M. violacea</i> (Agassiz and Mayer, 1899)
6	4 perradial tentacles with large, globose bulbs, and 4 rudimentary bulbs, all without ocelli. = <i>M. macrobulbosa</i> Xu, Huang and Chen, 1991
6a	4 perradial tentacles with long conical-shaped bulbs, without ocelli, and 5 club-shaped tentaculæ between tentacles without bulbs, with ocelli, = <i>M. minutum</i> (Xu, Huang and Chen, 1991) transl. nov

Family Protiaridae Haeckel, 1879.

*Halitiara obtusus* n. sp. (Fig. 7)

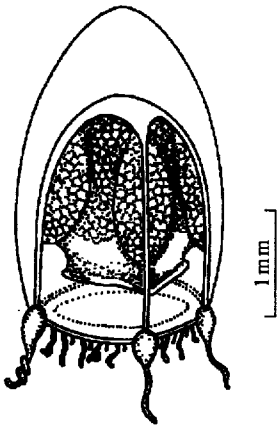


Fig. 7. *Halitiara obtusus* n. sp.

Umbrella 2.6-3.0 mm high, 1.3-1.5 mm wide, apex bluntly, devoid of evidence of apical projection, mesoglea thick especially in the apical region, thinning gradually toward umbrella

margin; manubrium broad and large, about 3/4 the length of subumbrella cavity; mouth simple, broad and large, cruciform opening; 4 perradial, diverticule gastric lobes extending from manubrial wall, the whole length not exceeding mouth rim, 2/3 of the length of the gastric lobes connected to the radial canals by mesenteries; gonad interradial, extending toward perradial diverticule gastric lobes; with 4 straight radial canals, and ring canal; with 4 perradial marginal tentacles, base bulbs conical-shaped, without ocelli; with 5-8 solid, cirrus-like, unequal size marginal tentacles between successive tentacles, without bulbs and ocelli; velum broad.

This new species has 4 straight radial canals; with 4 perradial marginal tentacles and 5-8 solid cirrus-like marginal tentacles; without rudimentary marginal bulbs; mouth simple; with mesenteries; interradial gonads; all ten-







